RETREAT AT AMHERST

DEFINITIVE PLAN DEVELOPMENT IMPACT STATEMENT
MAY 23RD, 2014

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Greenfield, Massachusetts 01301
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DEFINITIVE PLAN
DEVELOPMENT IMPACT STATEMENT

Name of Project: "Retreat at Amherst"

Type of Project: Cluster Subdivision with Requested Modifications

Location: Abuts Henry Street, Market Hill Road and Flat Hills Road

Parcel Number (s): 6A-84, 91, 95 & 96

Zoning District (s): R-O & R-N

Acreage: 147.3 Acres

Applicant: Retreat at Amherst, LLC
455 Epps Bridge Parkway
Suite 201
Athens, GA 30606
Contact: Jason Doornbos
706-543-1910

Owner: W.D. Cowls, Inc.
Land Company
134 Montague Road
N. Amherst, MA 01059

Engineers: 1. SVE Associates
377 Main Street
Greenfield, MA 01301
Contact: Anthony Wonseski, Jr., P.E.
413-774-6698

2. Williams and Associates
2470 Daniels Bridge Road
Suite 161
Athens, GA 30606
Contact: Jon Williams
706-310-0400

I Project Description

The property is 147.3 acres of forest land located in north Amherst. The property is owned by W. D. Cowls, Inc. and was recently removed from Chapter 61 status. The property is located within the 3/4 mile center core to Cushman Village.

The Retreat at Amherst will be developed as a Cluster Subdivision. The Subdivision consists of 123 residential lots with a mix of single family and two family homes. The ratio of the mix will be consistent with section 4.325 of the Amherst Zoning By-Law. Access to the project will be from Market Hill Road, Henry Street and Flat Hills Road. The Definitive plan has been revised from the Preliminary Plan based upon recommendations from the Planning Board. The existing entrance to the Town's Water Treatment Plant will be extended to provide primary access to the project. Secondary entrances to the project will be off of Henry Street and Flat Hills Road.

II Circulation System

The Definitive Subdivision Plan has three access points connecting to existing Public Town Ways. They are located at the existing entry driveway to the Town's Water Treatment Plant which is considered the primary entrance. The Town currently has an easement over the property to access the Treatment Plant. The project will dedicate public street right of way to the Town so the easement will no longer be required. The second access is located on Henry Street approximately 1300 lineal feet south of Pine Street and the third entrance will be located off of Flat Hills Road approximately 1950 lineal feet south of High Point Drive. The street connections to Henry Street and Flat Hills Road are considered secondary entrances. Most of the streets within the site will be classified as minor streets and cul-de-sac streets.
Street A could be considered a Secondary Street. The proposed project streets are currently intended to be private.

As a result of the natural conditions of the property, a cluster subdivision appears to be least impactful on the environment and surrounding land. A cluster development will allow for the dedication of open space and protect wild life corridors. Because of these overall goals, the applicant will be requesting design exceptions to some of the street standards identified in the Subdivision Regulations (section V.G.2).

The applicant has contracted with a Traffic Engineering Company (BETA Group) to provide traffic engineering services. The applicant's engineers have met with the Town of Amherst Department of Public Works to scope out the traffic study. The study analyzed traffic impacts expected from this development and make recommendations mitigating those impacts associated with the development. The Detailed Traffic Study is included with the Definitive Plan Submittal.

The project will encourage the use of Mass Transit. Bus Route 32 currently services the Cushman Area. The applicant plans to work with both UMASS and the Pioneer Valley Transit Authority to determine if it would be beneficial to enlarge the current routes to circle through the proposed development and provide a new bus stop within the project. Refer to Document #3 for an exhibit depicting the Amherst bus stop locations from the Amherst Comprehensive Planning Study (ACPS).

The project will also encourage the use of bicycles providing bicycle racks at the office/amenity area and also providing space at the units for bicycle storage. The project will provide a multi-use pedestrian/bike trail throughout the development. With the project approximately 3 miles from downtown and the UMASS Haigis Mall, bicycle transportation provides another opportunity for the residents while simultaneously decreasing traffic impact and negative environmental effects. Also, the project is located approximately 1.3 miles to North Amherst Center. Refer to Document #4 for an exhibit showing the existing and proposed bicycle routes according to the Town's Master Plan.

The project is located in North Amherst. The Robert Frost Trail traverses the northern end of the property. The development provides a pedestrian connection to the trail. The trail will be relocated at the north end of the property to accommodate the development. With access to the trail, users will be able to loop to the Walt Whitman Trail to the north and also access the Puffers Pond and Mill River Area Recreation to the northwest. Refer to Document #5 for an exhibit showing the pedestrian path and trails per the Master Plan.

III Support Systems

a. Water Distribution

The project will be served by the Town's public water system. There are existing water facilities in Henry Street and Market Hill Road. As a result of the elevation of the project, additional infrastructure will be required. A booster pump and a possible reservoir may need to be constructed in order to supply potable water and fire protection service to the development. The Applicant's Engineers and the Amherst Department of Public Works will coordinate on the design of the system. The main onsite distribution system will be designed and constructed in accordance with town standards.

Refer to Document #6 for an exhibit showing the Municipal Sewer and Water facilities within the town per the Master Plan.

b. Sewage Disposal

The Retreat Project will connect to the Town's public sewer system. There are public sewers facilities in Pine Street and Market Hill Road. The onsite sewer system will be designed and constructed as a public system. Easements will be provided onsite for both public water and sewer systems. One onsite public sewer lift stations will be constructed adjacent to Henry Street to force sewer to Pine Street. This facility is required as a result of the natural topography of the property. It is important to note that the proposed water and sewer facilities will be extended to Flat Hills Road to provide for future connection for existing residences located along Flat Hills Road and High Point Drive. Refer to Sewer Extension by CDM, dated 2005 which classified the High Point Drive area as an area of moderate need for improvement.

c. Storm Drainage

The project is designed in accordance with the Massachusetts Storm Water Standards. Evaluations are performed for the 2, 10 and 100 year design storms. The development is considered a new development as there was no previous development on the property.

The Storm Water Standards and goals of this development:

1. Storm water runoff will be treated through Best Management Practices prior to discharge into Wetlands or Waters of the Commonwealth.

2. Storm Water Systems will be designed so that post-development peak discharge rates do not exceed pre-development expected peak discharge rates. This standard will be accomplished by constructing standard detention and/or infiltration basins. The municipal storm drain system in the road to the treatment plant has been designed to accept storm drain runoff associated with extension of the road. As a result of the topography and rock out cropping no detention is designed at this location. Storm water runoff will be treated through the use of a hydrodynamic separation unit.

3. Depending on the project soils the applicant will provide Best Management infiltration systems to promote the recharge of runoff from the post development site that of the expected annual recharge from the pre-development conditions. The project as proposed is a Cluster Development which will minimize the amount of impervious area and can be considered an environmentally sensitive design development.

4. The proposed Storm Water Management system is designed to remove the average annual post construction load of Total Suspended Solids (TSS)

through the use of BMPS identified in the Massachusetts Storm Water Hand Book.

5. This development will not be considered a land use with higher potential pollutant loads. This standard does not apply to this development.

6. The property is not located within a Zone II or Interim Wetland Protection Area according to the State and Town GIS Data Base therefore this standard does not apply to this development.

7. The project is not a redevelopment projects so this standard does not apply.

8. Definitive Subdivision Plans contain plans to control construction related impacts such as erosion, sedimentation and other pollution sources during construction. A Notice of Intent and Storm Water Pollution Prevention Plan will be prepared for this development in accordance with Federal NPDES Requirements.

9. A long-term Operation and Maintenance Plan for the proposed Storm Water Management System has been provided and submitted with the Definitive Subdivision Plan.

10. There are no known illicit discharges to the Municipal Storm Water System or natural streams. The applicant will provide the Town with a statement ensuring no illicit discharges will occur as part of the development.

    There are numerous Wetland Areas associated with intermittent streams on-site. As a Cluster Development, the proposed crossings of the streams are reduced from a traditional subdivision. These proposed crossings are designed to be constructed in accordance with Massachusetts Stream Crossing Guidelines.

d. Refuse Disposal

This is a residential project so hazardous materials requiring special precautions is not expected. Normal refuse collection will be done through a contract with a private trash collection company. Refuse will either be picked up by maintenance staff and taken to a compactor on site for haul-off or there will be curb side pickup at the residential units. A trash enclosure at the office/amenity area is anticipated.

e. Lighting

The project will provide street lighting along the private roads for safety and security purposes. There will also be outside lighting at the office/amenity and outside recreation area. Final details of this facility will be provided with Review

and Site Plan Approval. The lighting design will be down cast and will not extend past the subdivision boundary so as not to adversely impact abutting properties.

f. Fire Protection

As mentioned earlier there is no hazardous material storage associated with this project. This is a residential project that will be designed and constructed in accordance with current State and Local Building and Fire Codes.

g. Recreation

There are no public recreation facilities proposed as part of this development. The project development does propose on site recreational facilities for the residents of the project and guests.

h. Schools

The anticipated composition of the subdivision inhabitants is expected to have negligible impact on the number of children in the public school system. Rather, a positive financial impact is expected resulting from the revenue to the Town through increased real estate taxes, excise taxes, building permit and construction related fees.

IV Natural Conditions

a. Topography

The town of Amherst GIS topography was used for this preliminary plan. The property is moderately steep and has numerous intermittent streams. There are sections of steep natural slopes. The cluster development will protect a majority of these slopes and streams from development.

b. Soils

Review of the Natural Resources Conservation Services Web Soil Survey indicates that the majority of the property surface soils consist of Gloucester Series Soils. Gloucester fine sandy loams are somewhat excessively drained soil and are underlain by stony loamy sand or stony sandy till. A typical Gloucester soil is extremely stony on the surface. Stones 24 inches to boulders 5 feet in diameter are common on the surface. There are areas of exposed bedrock on the property. Gloucester soils are classified as hydrologic Group A soils which have a high infiltration capacity.

The applicant has contracted with a local Geotechnical Engineer O'Reilly, Talbot and Okun to provide a Geotechnical Investigation of the property and supply recommendations for design and construction of the development. These recommendations are accounted for with the Definitive Subdivision Design. A copy of the investigation is provided with the Definitive Subdivision Plan Submittal.

c. Mineral Resources

The project is a residential development. We do not expect to find any important mineral resources on the property. There are no plans for extraction and sale of any mineral resources.

d. Surficial Geology

Review of the Massachusetts Geographic Information data layers indicates the property is mostly till and sand. The area between Henry Street and the Power Lines may consist of sand and gravel deposits. A Geotechnical Investigation is provided with the Definitive Plan Submitted.

e. Depth of Water Table

Based on the Soil Survey for Hampshire County, Central Part anticipated Depth to Water Table should be greater than 6 feet. This is an approximation. The Geotechnical Investigation provides actual test pit information which shows estimated high water table at the locations tested. Additional test pit information will be gathered at each infiltration basin location.

f. Aquifer Recharge Areas

According to the Massachusetts data layers the property is not located in an aquifer recharge area.

g. Wetlands

The applicant contracted with Wendell Wetland Services to provide wetland delineation services. Wendell Wetland Services has visited the property on numerous occasions and has flagged the wetland boundary according to state requirements. SVE Associates has located by field survey the flagged wetlands. The project plans show the locations of the jurisdictional wetlands located on the property. An Abbreviated Notice of Resource Area Delineation (ANRAD) has been filed with the Amherst Conservation Commission. A Notice of Intent will be submitted to the Commission to obtain permits in accordance with the Massachusetts Wetland Protection Act & Local Wetlands ByLaw.

h. Watercourses

There are approximately eight intermittent streams and associated Bordering Vegetated Wetlands on the property. These streams drain from north to south and southwest to Hawley Brook then on to Adams Brook and then to the Fort River before leaving the Town of Amherst.

i. Flood Prone Areas

According to Flood Insurance Rate Map for the Town of Amherst, Community Panel Number 250156-005C, dated, December 15, 1983. The property is not located in a designated Special Flood Hazard Area. The property is located in zone c.

j. Vegetative Cover

The property is forest land. W.D. Cowls, Inc. has managed and harvested timber from this parcel for many years. The most recent work occurred within the last 5 years. A habitat Assessment of the property has been prepared for the property and is submitted to the Board as part of the Definitive Plan Submittal.

k. Unique Wildlife Habitats

As mentioned earlier the applicant will be providing a Habitat Assessment of the property with Definitive Subdivision Plan Submittal. One of the known facts of this area is that the area between the Power transmission easement and Henry Street provides habitat for the yellow-spotted salamanders. In the spring the Salamanders migrate west down hill to the wetland areas located west of Henry Street along the New England Central Railroad. Although these are not listed as threatened or endangered there has been significant community interest in them for the last thirty or so years. The community constructed tunnels under Henry Street to provide safe passage. The Hitchcock Center for the Environment has been instrumental along with many community volunteers in keeping the tunnels maintained and looking after the Salamanders.

l. Unique Flora

As mentioned earlier a habitat assessment is submitted with the Definitive Subdivision and addresses in more detail any unique flora that is associated with the property.

V Design Factors

a/b. Present Visual Qualities and Location of significant View Points

There are no onsite important view sheds. North along Market Hill Road there are high and medium quality scenic views according to the scenic view shed assessment for the Amherst Comprehensive Study. Refer to Document #7 for an exhibit showing the Scenic Views, Open Space Protection Priorities and Natural Resources per the Master Plan and ACPS.

c/d. Historic and/or Architecturally Significant Structures

Cushman Village is a former Mill Village dating back to the 1700's. The Center includes numerous historic structures and is recognized as the Cushman Village National Historic District. The subject property is not within the District and there are no known Historic or Architecturally Significant structures on the property. The property appears to be undeveloped Forested Land that has been logged over the years. Refer to Document #8 for an exhibit showing the Historical and Cultural Resources per the Master Plan.

e. Type of Architecture for Development

The Amherst Retreat project will follow its typical architectural style. The applicant develops a cottage style home. Copies of typical home elevations and plans are included with this report. See Document #2.

VI Environmental Impact

a. Measures Taken to Prevent Surface Water Contamination

As mentioned earlier in the Storm Water section the project will be designed and constructed in accordance with the Massachusetts Storm Water Standards. The Standards were adopted to mitigate storm water development runoff from discharging directly downstream to wetlands and waters of the Commonwealth without treatment through Best Management Practices.

b. Measures taken to Prevent Ground Water Contamination

The Geotechnical Investigation confirms there are locations of soils on site that are conducive to rapid permeability the project design provides added design measures to ensure treatment of impervious flows recharge to ground water in accordance with the Storm Water Standards.

c. Measures Taken to Maximize Ground Water Recharge

The Storm Water Standards require new development to recharge annual estimated quantities due to new impervious area to approximate that of pre-development conditions. This is done through the use of Infiltration Best Management Practices and also through environmentally sensitive site design. The cluster subdivision submitted is much more environmentally sensitive then a standard residential subdivision.

d. Measures Taken to Prevent Air Pollution

The project will promote the use of mass transit and bicycle use. If residents take advantage of these available facilities then a reduction in air pollution can be expected.

e. Measures Taken to Prevent Erosion and Sedimentation

During the construction phase of the project development best management practices will be implemented to mitigate erosion and sedimentation. Erosion control plans are submitted as part of the Definitive Plan submittal.
A Notice of Intent and Storm Water Pollution Prevention Plan (SWPPP) will be prepared in accordance with Federal NPDES Requirements.
The graded areas created during construction will be loamed and seeded. An Operation and Maintenance Plan has been developed for the private storm drain facilities.

f. Measures Taken to Maintain Slope Stability

Most of the existing very steep slopes will not be disturbed to develop this project. Steep slopes and manufactured slopes will be treated after construction so as to mitigate the potential for erosion and stability. The Geotechnical Investigation provides recommendations for slope stability. Erosion Control measures could include straw matting, bonded fiber matrix, hydro seeding, etc. Slopes and disturbed areas will at a minimum be loamed and seeded to prevent long term erosion.

g. Measures Taken to Reduce Noise Pollution

Construction Related Noise will be mitigated by operating within the requirements of the Town of Amherst Permit Requirements.

Post construction related noise will be maintained by permit. Residents will be subject to project Rules and Regulations which control noise and activities within the development.

h. Measures Taken to Preserve Significant Views

There are no identified significant view sheds except north of the property along Market Hill Road. The development provides numerous natural areas that will be dedicated open space. A segment of the Robert Frost Trail will be relocated through the development and a portion will be left in natural open space.

i. Measures Taken in Project Design to Conserve Energy

The project structures will be design and constructed per Federal, State, and Local Building Codes.

j. Measures Taken to Preserve Wildlife Habitats

The project is designed as a cluster subdivision. Wetland crossings will be constructed in accordance with Massachusetts Stream Crossing Guidelines. The project residences are concentrated on uplands areas of the property. The area between the Power Lines and Henry Street has been preserved so as not to impact the yellow-spotted Salamanders as mentioned earlier.

Wildlife corridors will be left along the streams. Open space easements will be granted as part of the Definitive Plan along the back of lots and areas which are not needed for physical development of the project. This development method is much more environmentally site sensitive than a typical subdivision.

k. Measures Taken to Ensure Compatibility with Surrounding Land Uses

The Amherst Retreat is a residential project and has been designed in accordance with the Town of Amherst Zoning By Law. The abutting properties are residential with the exception of the Town's Water Treatment Plant on Market Hill Road.

VII Plans

a. Master Plan

The property is located within the ¾ mile radius to the Cushman Village Center Core. This location makes the property attractive for residential development. The property is also located near supporting services such as public water and sewer facilities. The project is located near mass transit and will promote the use of mass transit.

The Retreat has been designed as a cluster subdivision based on recommendation from the Planning Board as a result of the Preliminary Plan Process which this development method is the least impactful small lot development allowed under the current zoning By Law. The project will utilize both single family and duplex units as encouraged in the Master Plan. The architectural style of cottages will blend with the community but location of the actual homes will be somewhat isolated from the abutting residences.

The Retreat has been designed in an environmentally sensitive manner utilizing the cluster development methods. This method allows the units to be place in upland areas of the property and allows for preservation of natural open space. The open space dedication within the development will protect natural areas and provide wildlife corridors throughout the development. The project provides a trail connection so residents will be able to utilize the trails to access other conservation areas such as Puffers Pond and the Mill River Recreation Area.

The project will also preserve the area off of Henry Street where the existing salamander crossings under Henry Street are located. The area provides habitat for the Yellow-Spotted Salamander. In the spring the Salamanders migrate downhill to the wetlands located west of Henry Street.

The project will be required to cross some of the intermittent streams in order to get to the upland areas for development. The crossing will be designed in accordance with the Massachusetts Stream Crossing Guidelines. Along the streams open space areas will be dedicated in order to provide wild life corridors along the intermittent streams for connectivity purpose through the developed area.

These design features are consistent with the goals and objections of the Cultural and Natural Resources Section of the Master Plan. As mentioned earlier in the report the project will contract directly with an outside trash collection company. Because this will be a residential subdivision, refuse will either be collected by maintenance personnel or there will be curbside trash and recycle pick up. A trash enclosure will be located at the project office /amenity area.
The development will extend Public Water and Sewer Services within the project and also extend them to Flat Hills Road. This extension will provide the Town with a public sewer connection as described in the Town's Sewer Extension Master Plan. Refer to Document #9 which is Appendix F of the Town of Amherst Sewer Extension Master Plan, Dated October 2005, which describes the potential options to provide sewer improvements to the High Point Drive subarea and Flat Hills Road.

Three of the five Planning Strategies identified in the Amherst Comprehension Planning Study dated May 2004 are incorporated in the Definitive Plan for the Retreat. They are Views Protection, Woodland Protection and Cluster

Development. The Village Center Development and Design Review Guidelines relate to the core.

The Cluster Development Method proposed for the Amherst Retreat is consistent with the Planning Strategies of the Study.

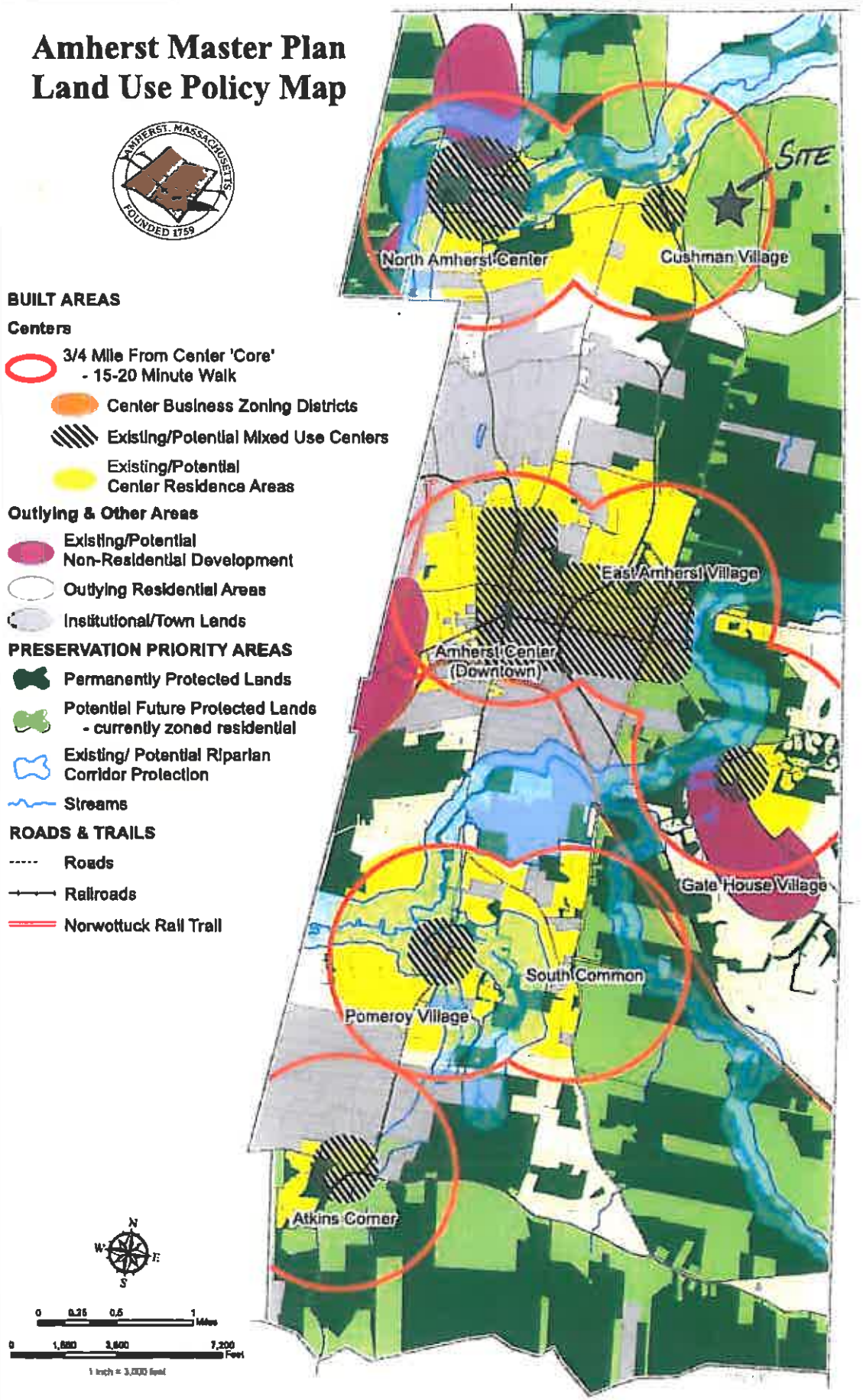
VIII Phasing

This Project will not be constructed in a phased manner. Once permits and approvals are obtained for the project, the project will proceed in a very methodical manner consistent with other completed Retreat projects. The construction sequence of events will be as follows:

1. Erosion Control Perimeter Work.
2. Clearing the Site and topsoil removal and stock pile outside resource areas.
3. Rough grading and Slope Stabilization BMP's.
4. Major Storm drain facility to control runoff.
5. Wet Utility Construction (i.e. Storm Drains, Water, Sewer, etc.)
6. Road Construction and Stream Crossings.
7. Lighting and Landscape along Roads.
8. Housing and Parking Areas.
9. Office /Amenity and Recreation Areas.
10. Finish Landscaping around dwelling units.

The public work infrastructure will be incorporated in the construction of the project as shown on the Definitive Plan.

Amherst Master Plan
Land Use Policy Map



BUILT AREAS

Centers

- 3/4 Mile From Center 'Core' - 15-20 Minute Walk
- Center Business Zoning Districts
- Existing/Potential Mixed Use Centers
- Existing/Potential Center Residence Areas

Outlying & Other Areas

- Existing/Potential Non-Residential Development
- Outlying Residential Areas
- Institutional/Town Lands

PRESERVATION PRIORITY AREAS

- Permanently Protected Lands
- Potential Future Protected Lands - currently zoned residential
- Existing/ Potential Riparian Corridor Protection
- Streams

ROADS & TRAILS

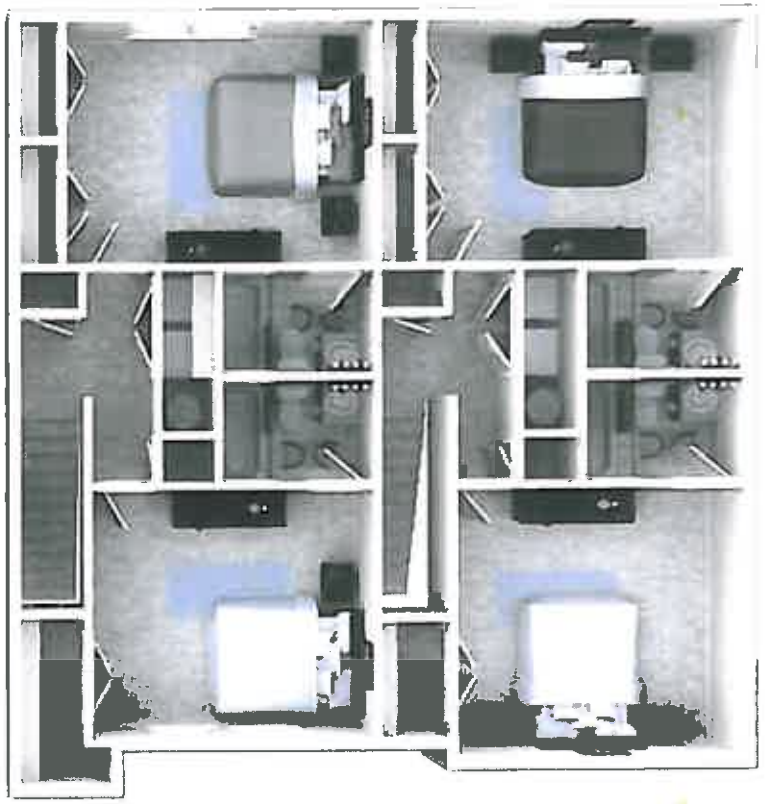
- Roads
- Railroads
- Norwottuck Rail Trail

Approved by the Amherst Planning Board on October 7, 2009.

#1

BIRCHMORE

#2-1



BIRCHMORE

2-24

BROOKSHIRE

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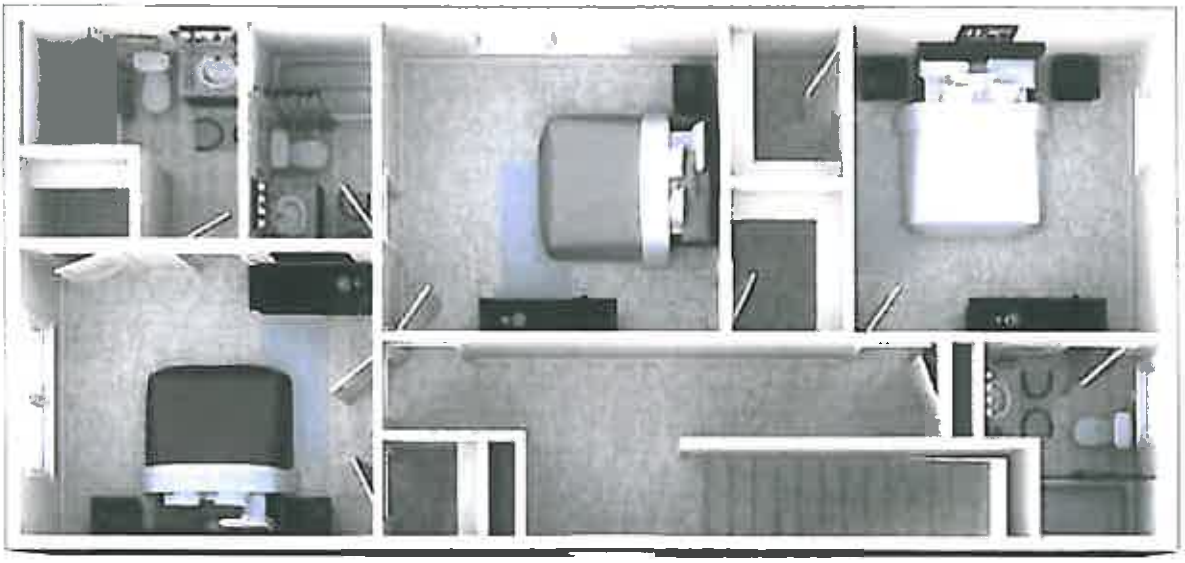
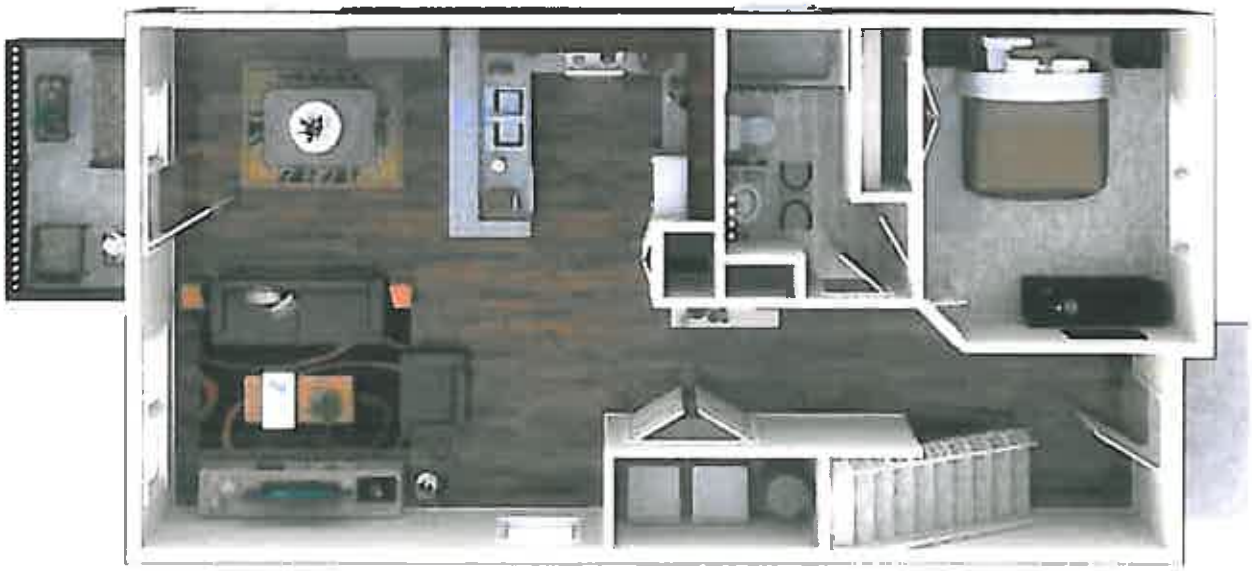
BROOKSHIRE

#2-4

ARTISAN





ARTISAN

#2-6

BLOOMFIELD

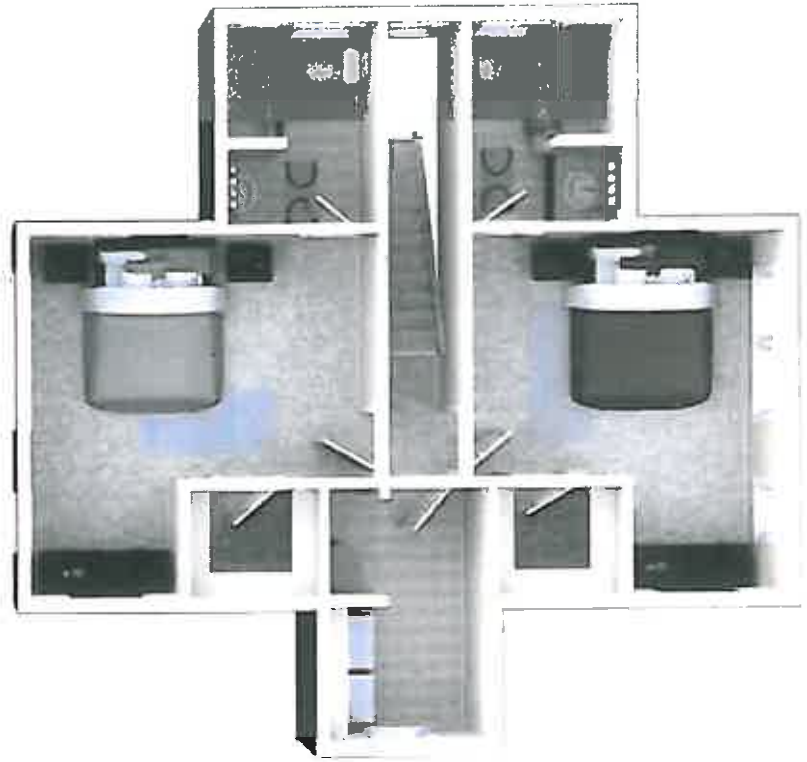
#27

BLOOMFIELD

#2-B

THORNBERRY

6-24

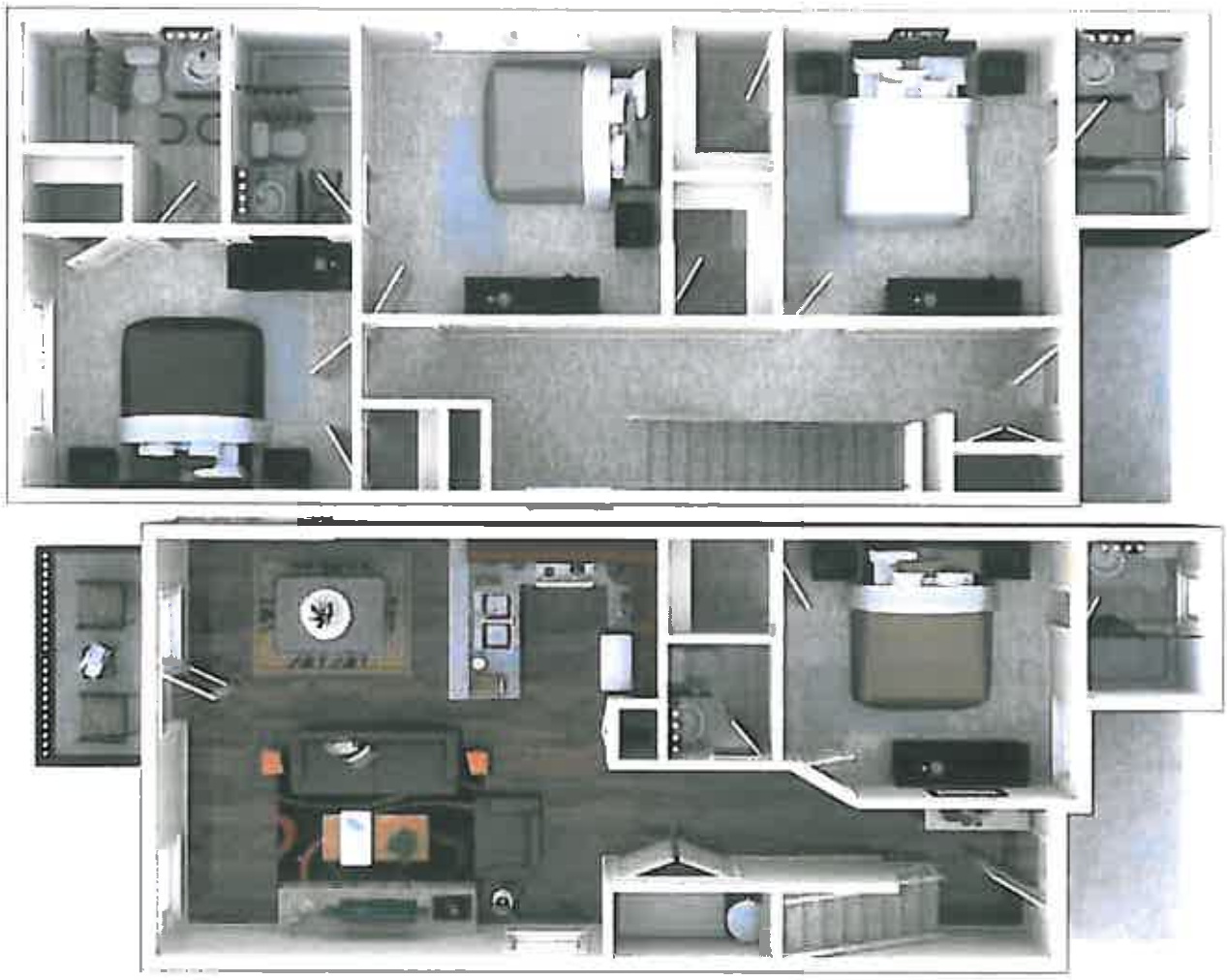


01-2#

THORNBERRY

SPRINGMORE

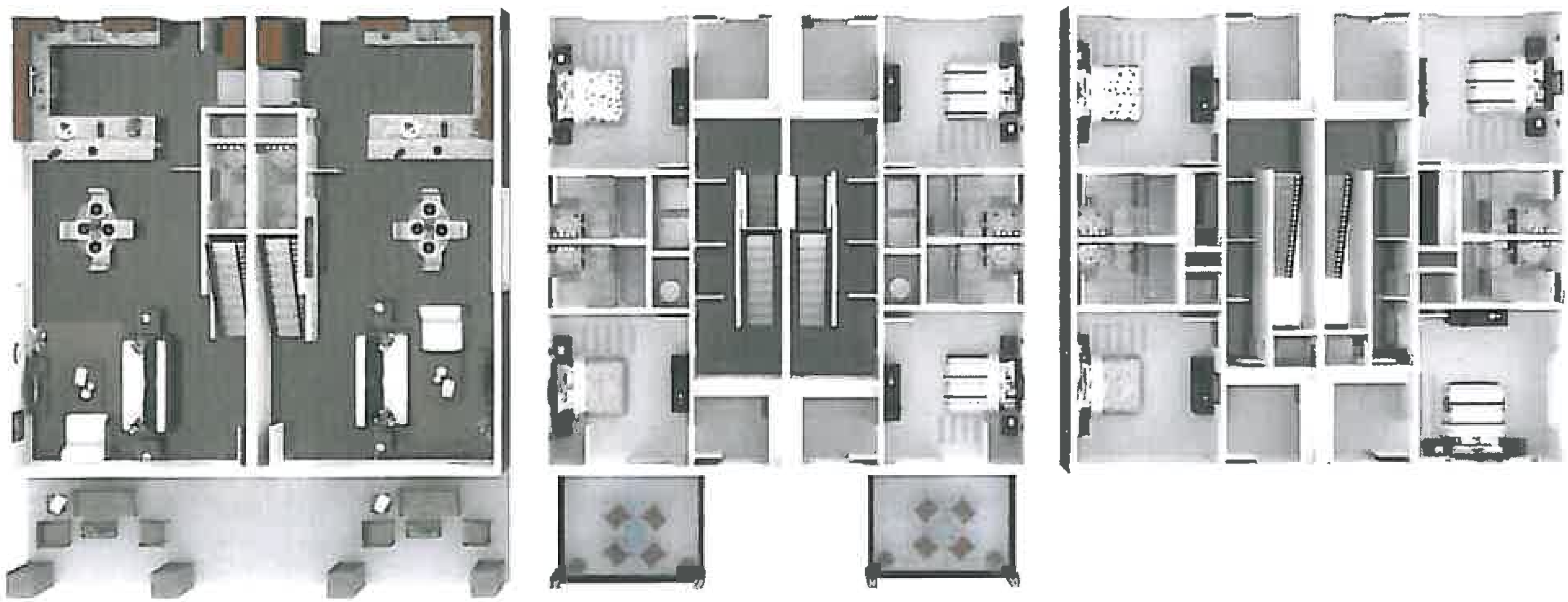
11-2#



SPRINGMORE

#2-12

STAFFORD

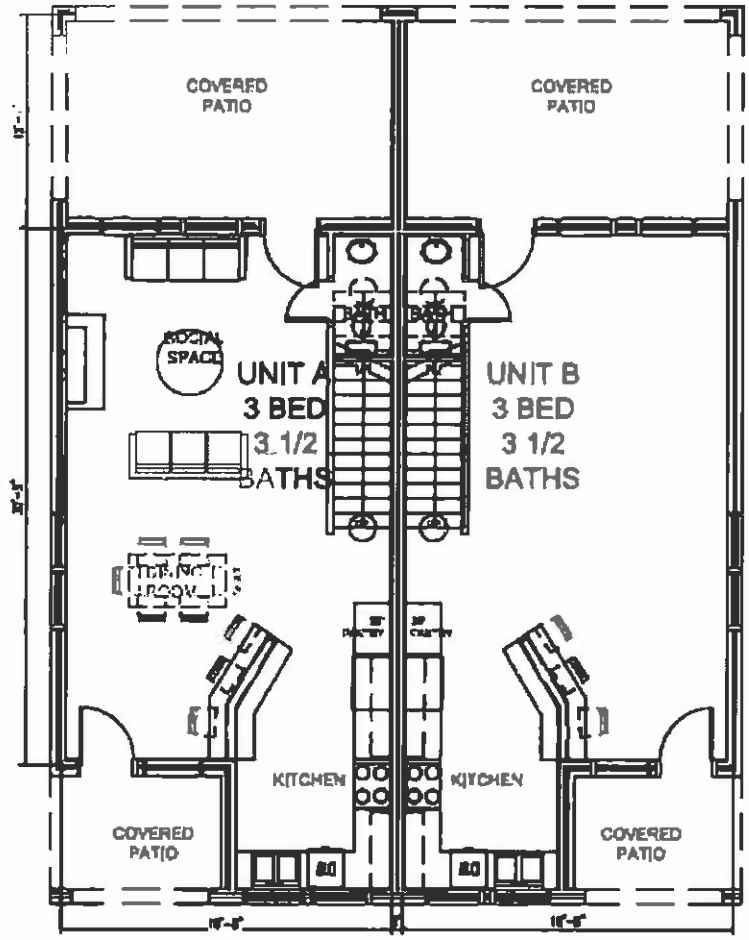


STAFFORD

#2-14

OAKVIEW

#2-15


COVERED PATIO
COVERED PATIO
UNIT A
3 BED
3 1/2
BATHS
UNIT B
3 BED
3 1/2
BATHS
KITCHEN
KITCHEN
COVERED PATIO
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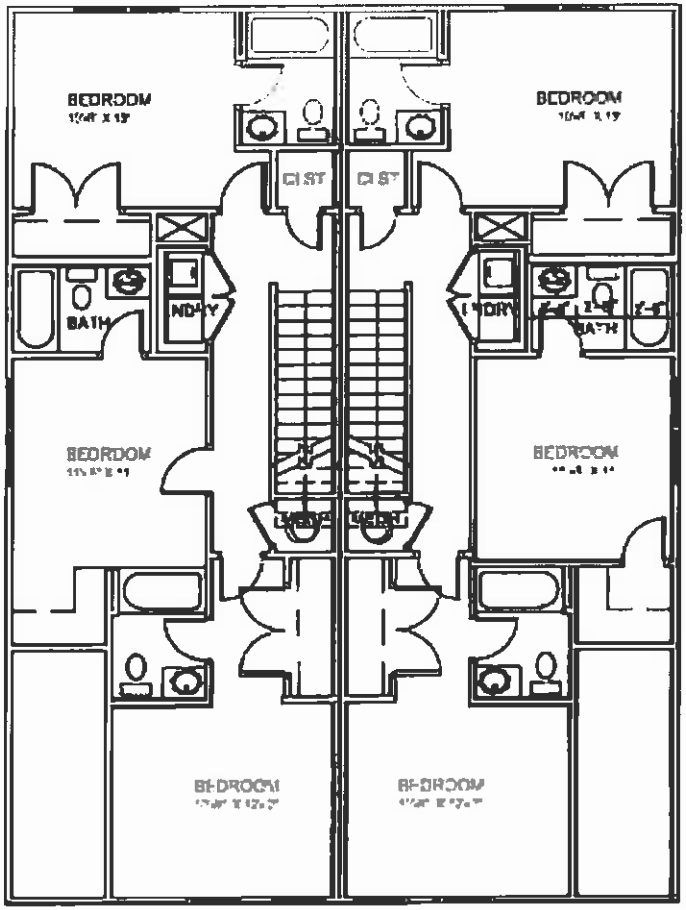
BEDROOM
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BATH
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OAKVIEW

#2-16

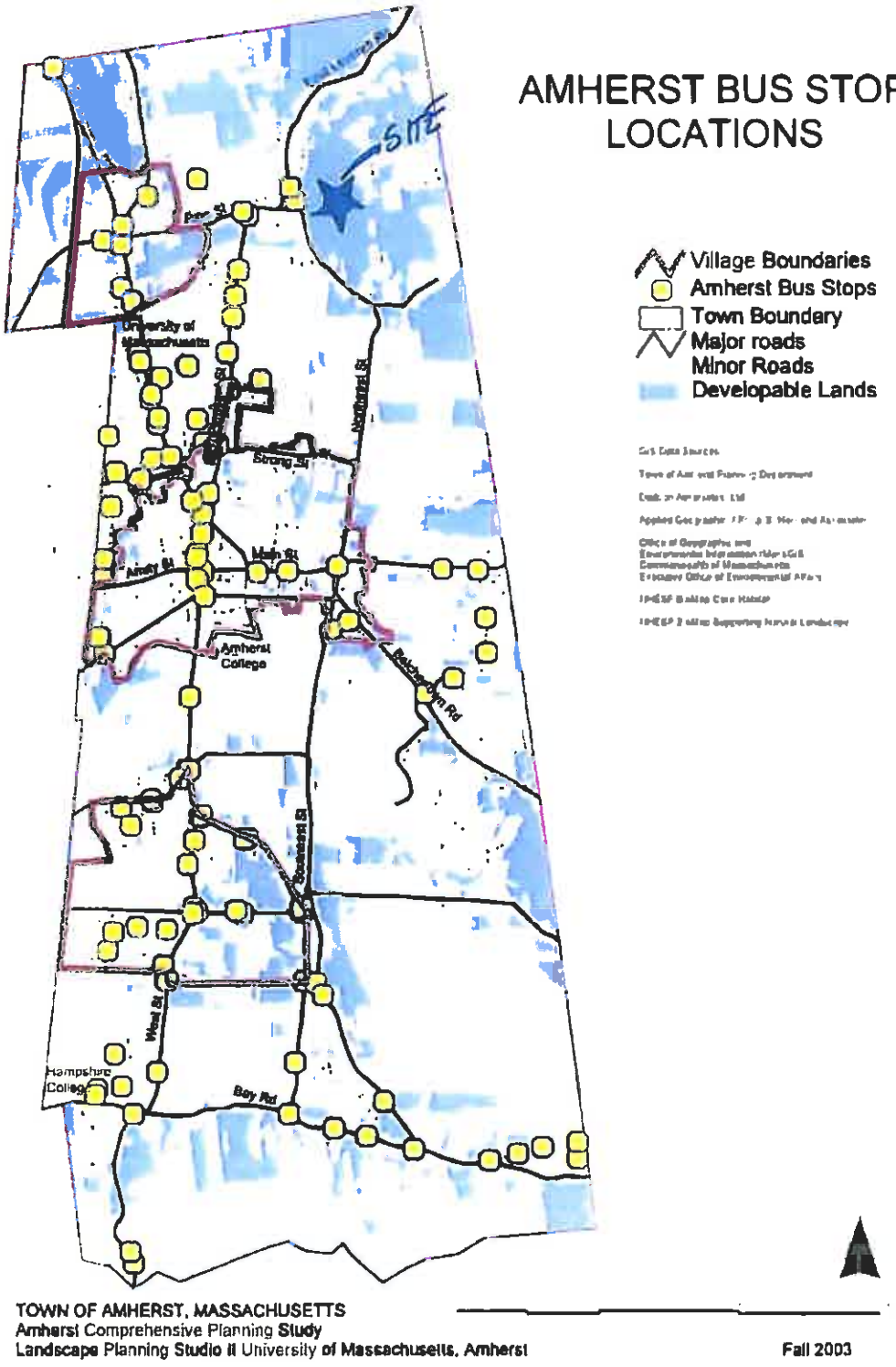
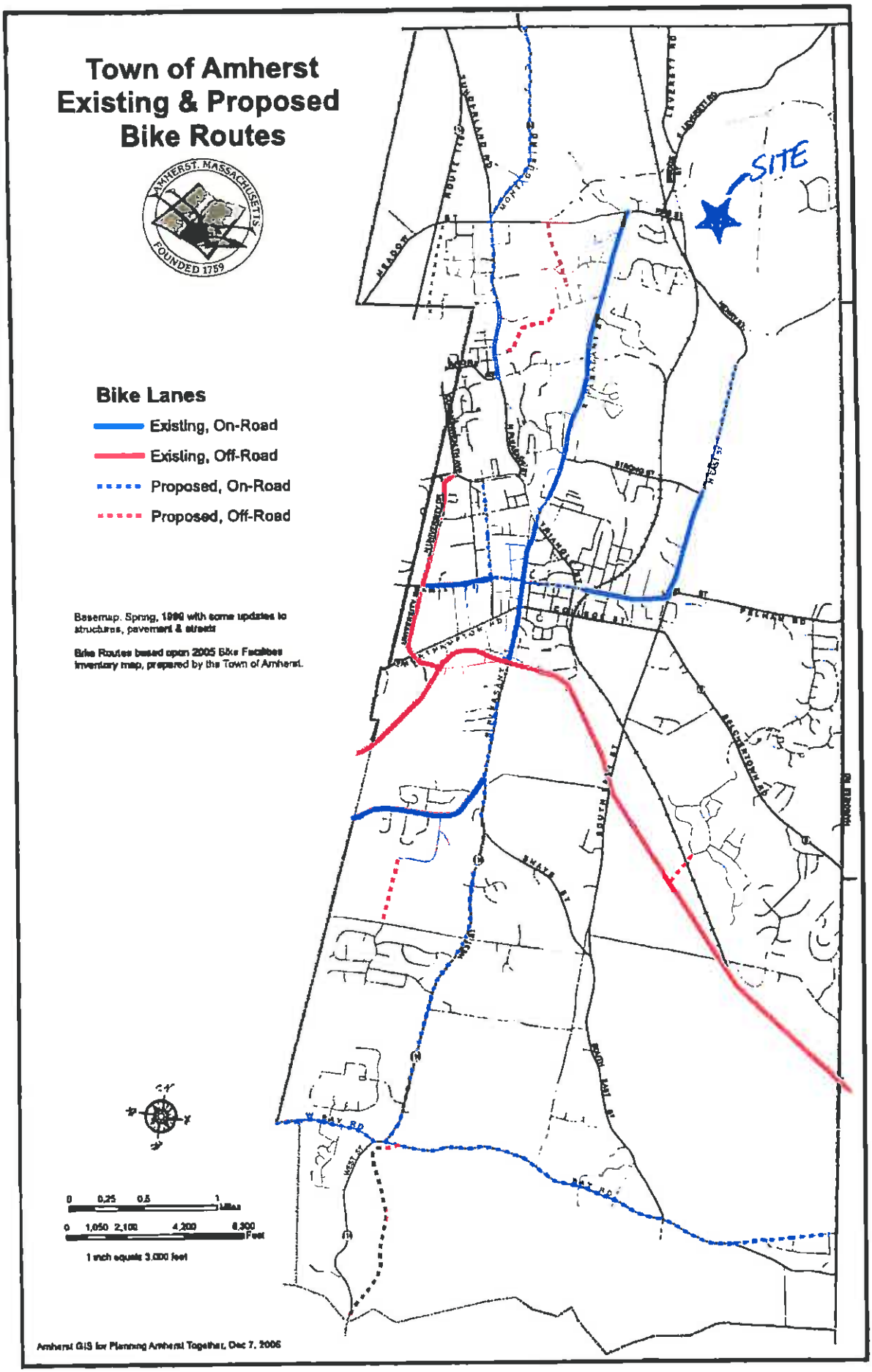


Figure 1.2: A number of the bus stops are in the three village centers, connecting them and providing easy access to these areas

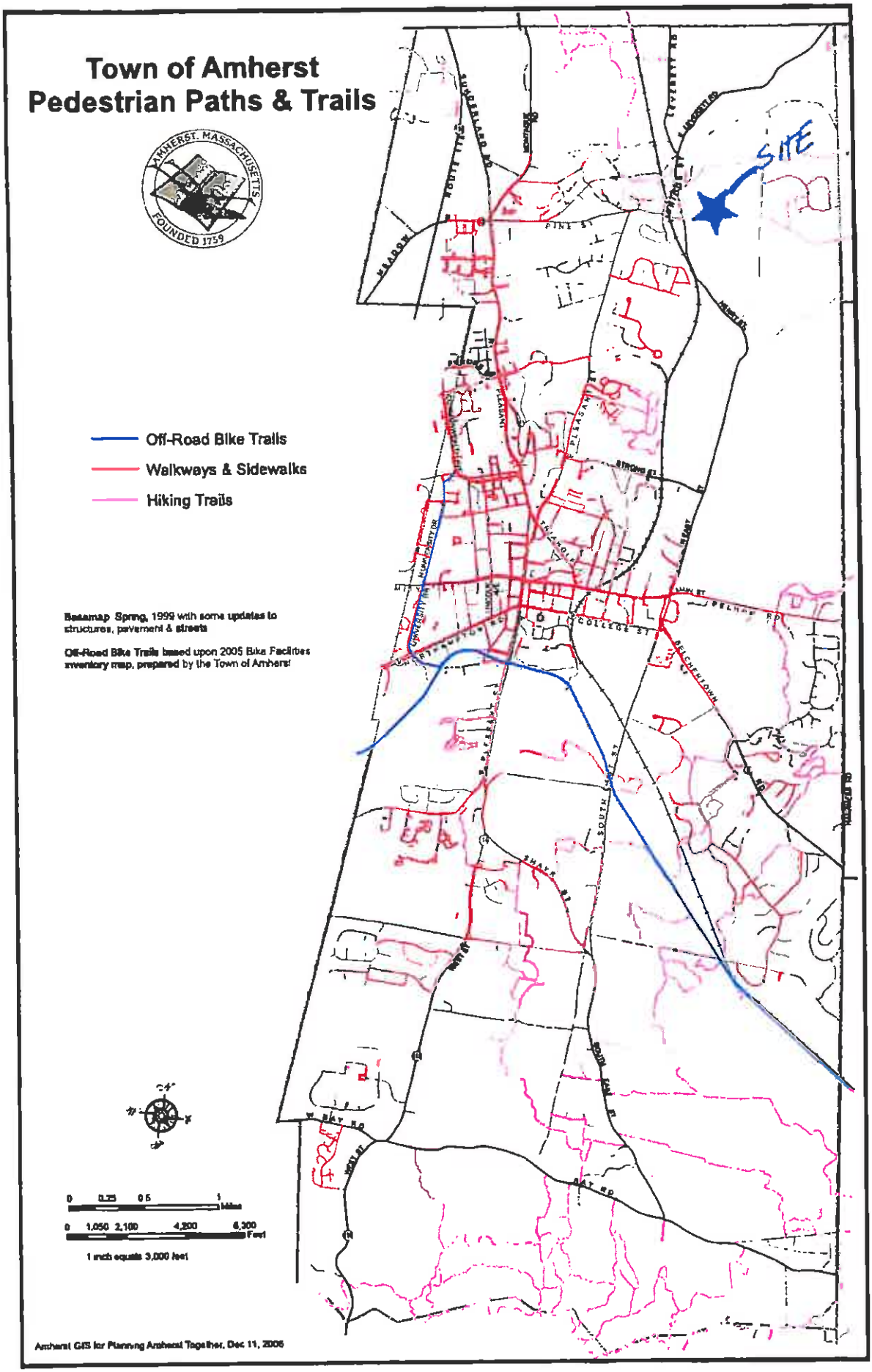
#3

Town of Amherst Existing & Proposed Bike Routes



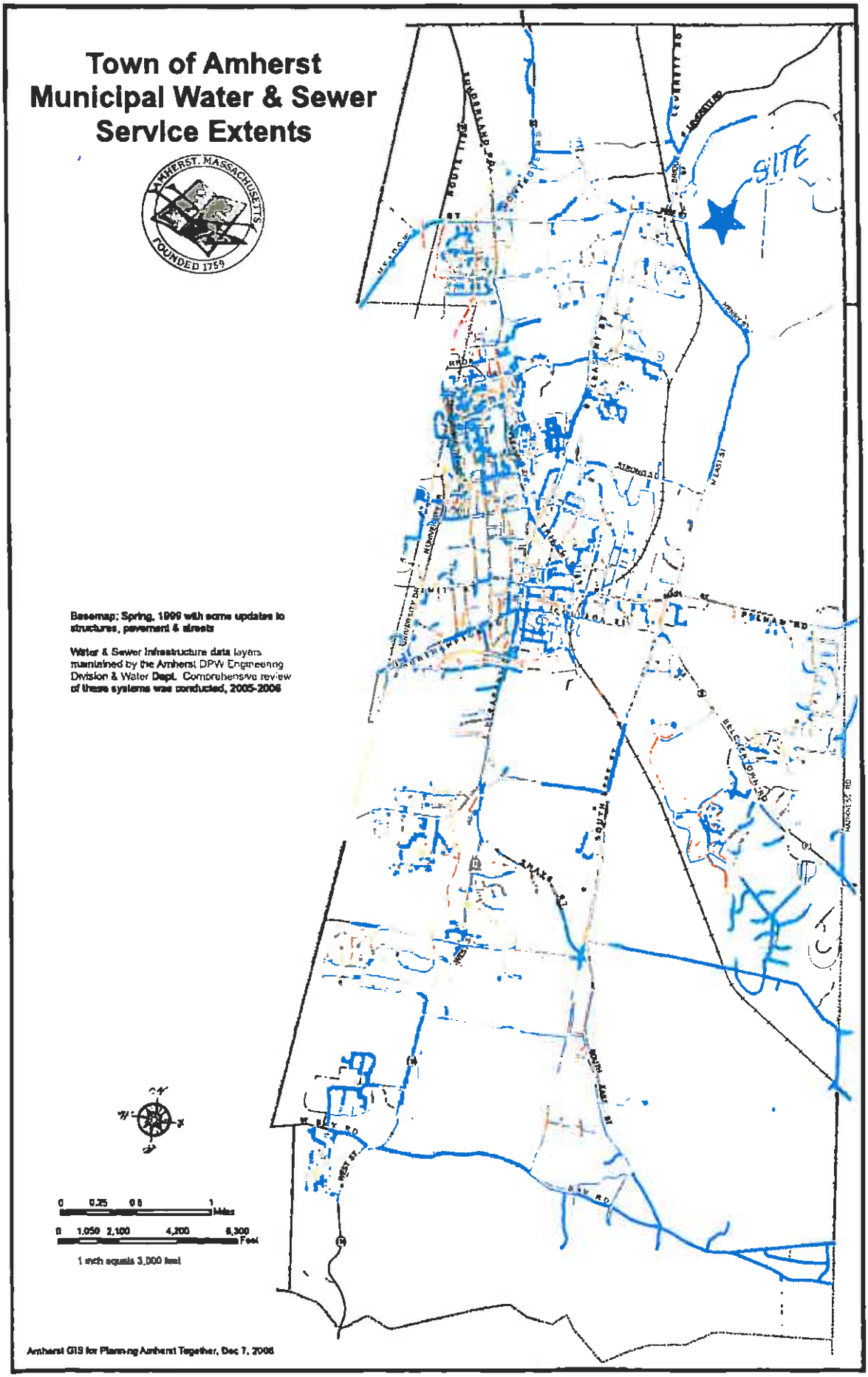
#4

Town of Amherst
Pedestrian Paths & Trails



#5

Town of Amherst
Municipal Water & Sewer
Service Extents



Basemap: Spring, 1999 with some updates to structures, pavement & streets

Water & Sewer infrastructure data layers maintained by the Amherst DPW Engineering Division & Water Dept. Comprehensive review of these systems was conducted, 2005-2006

0 0.25 0.5 1 Miles

0 1,050 2,100 4,200 6,300 Feet

1 inch equals 3,000 feet

Amherst GIS for Planning Amherst Together, Dec 7, 2006

#6

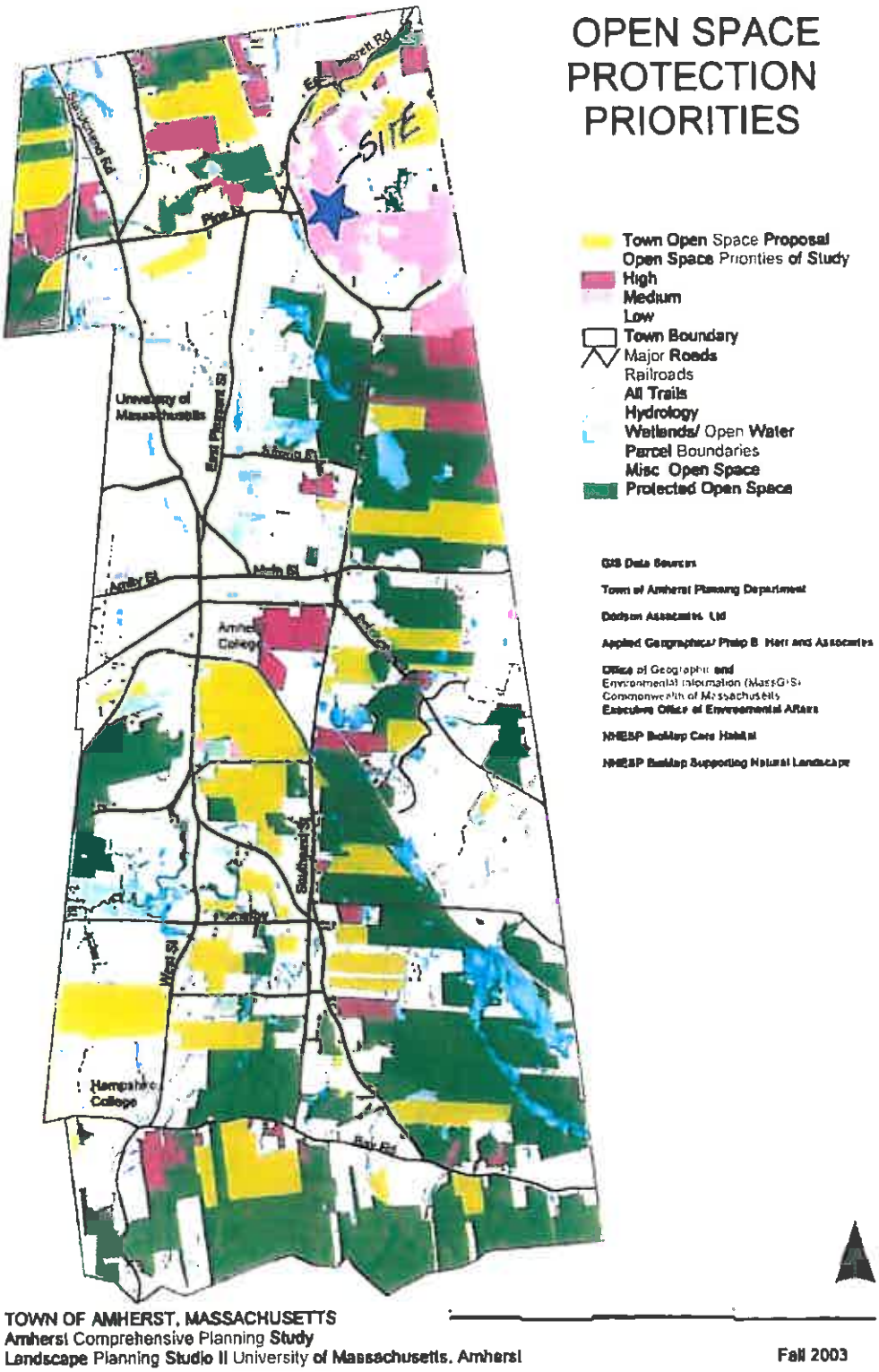


Figure 2.21: Town Proposed and Study Recommendations for Priority Protection

#7-1

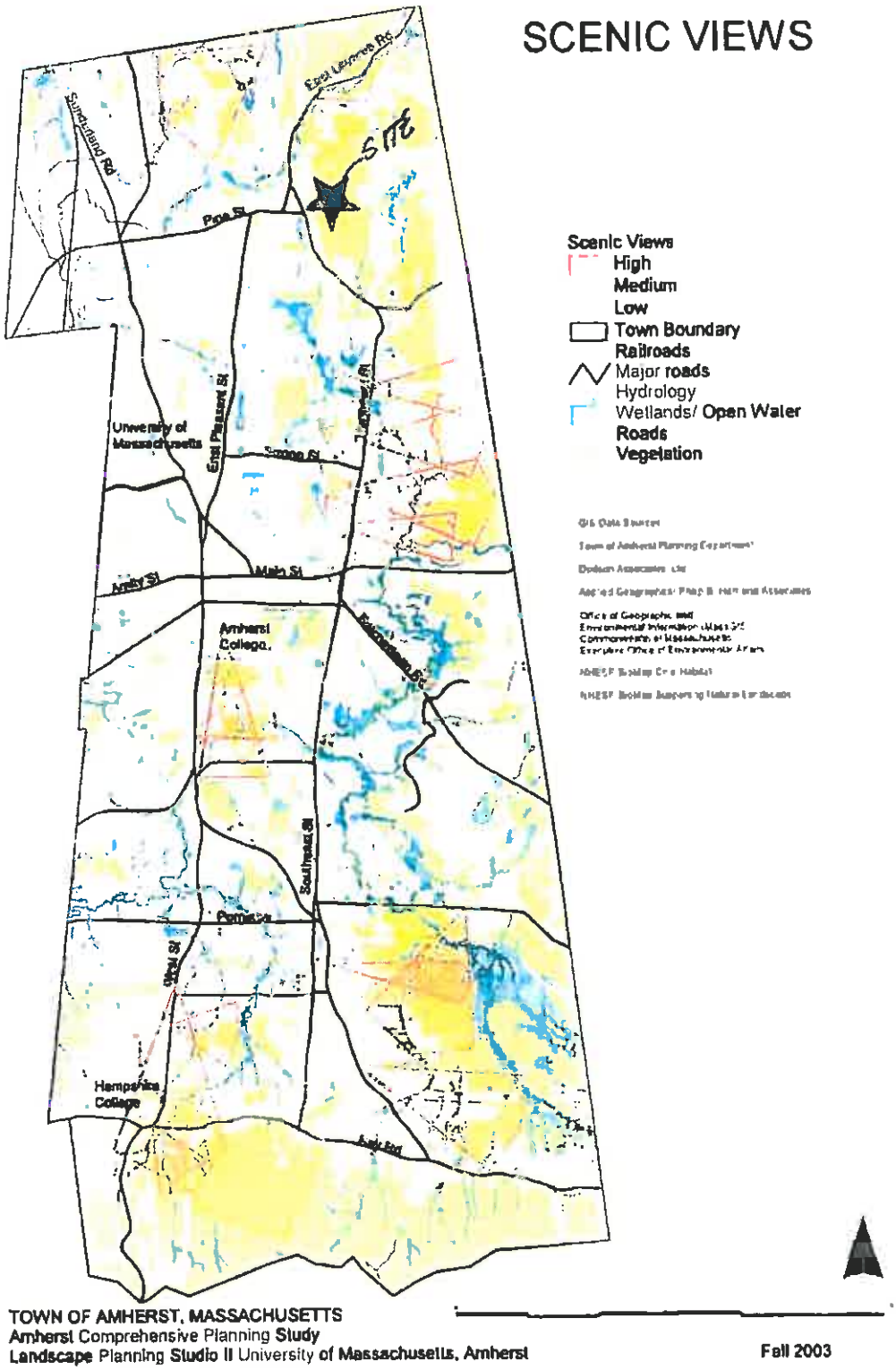


Figure 2.3: Scenic viewsheds assessment

#7-2

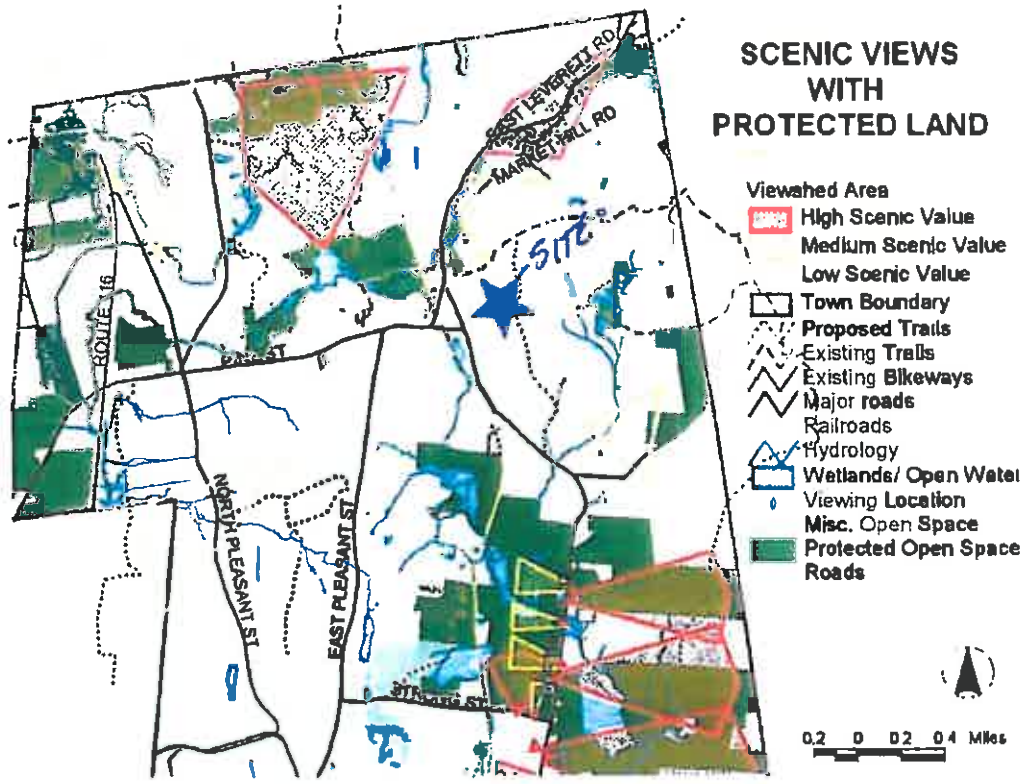


Fig 2 7: North Amherst: Scenic views and lands under existing protection

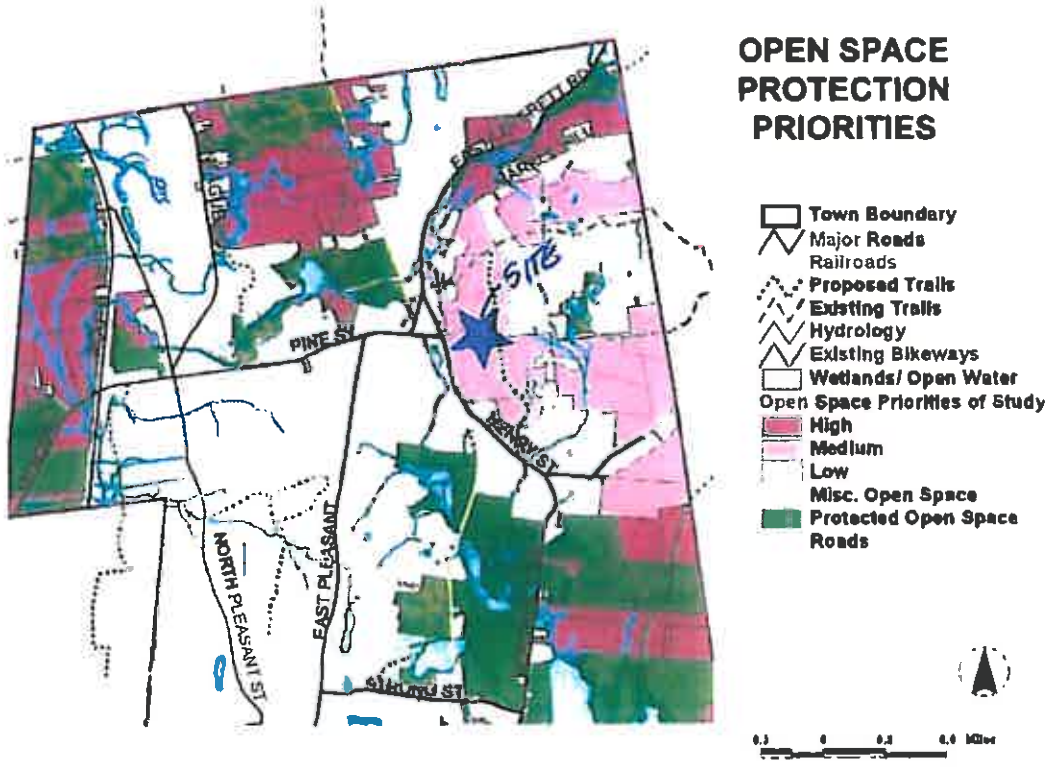
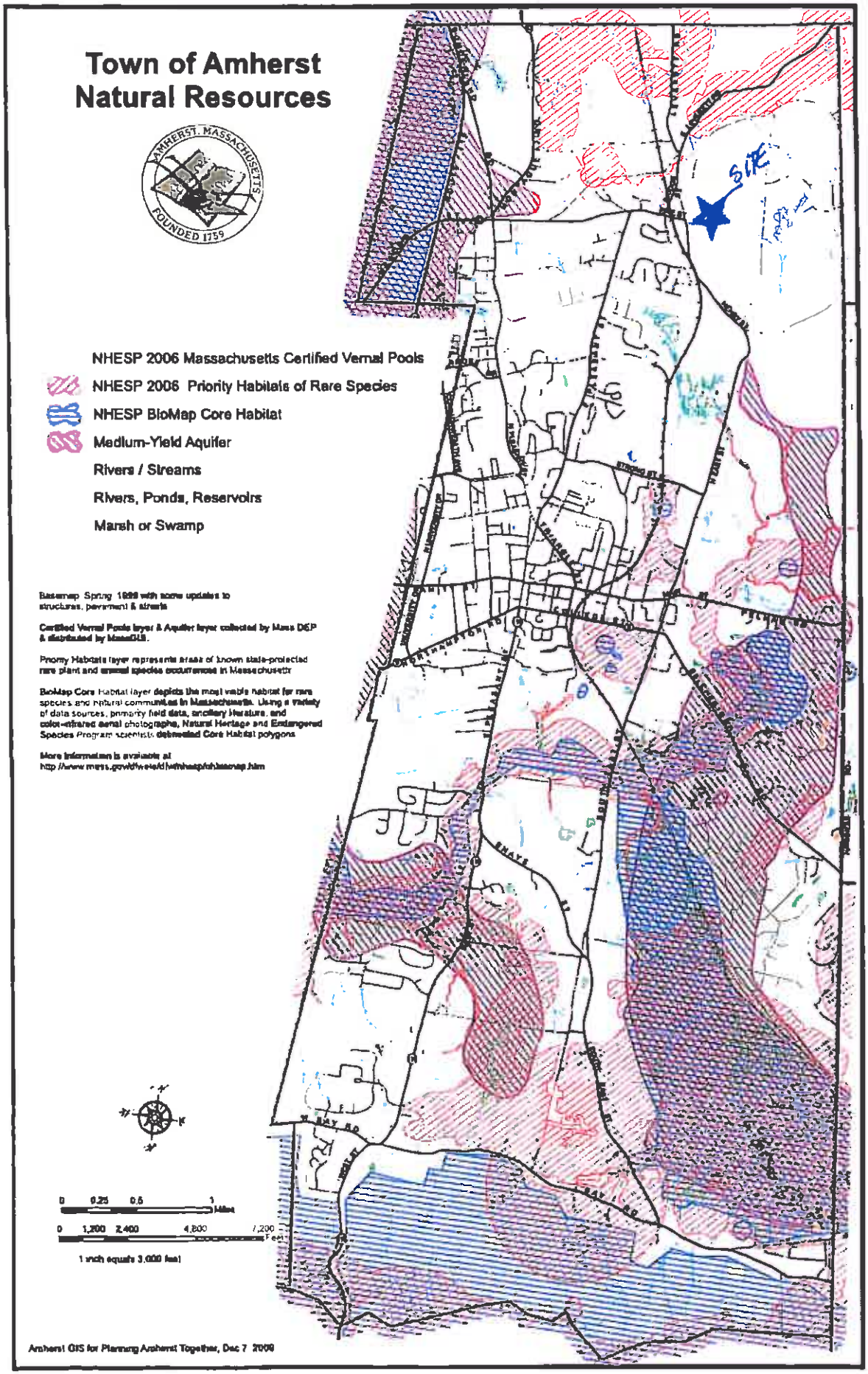


Fig 2.8: North Amherst: Priorities for protection as determined by the assessment matrix

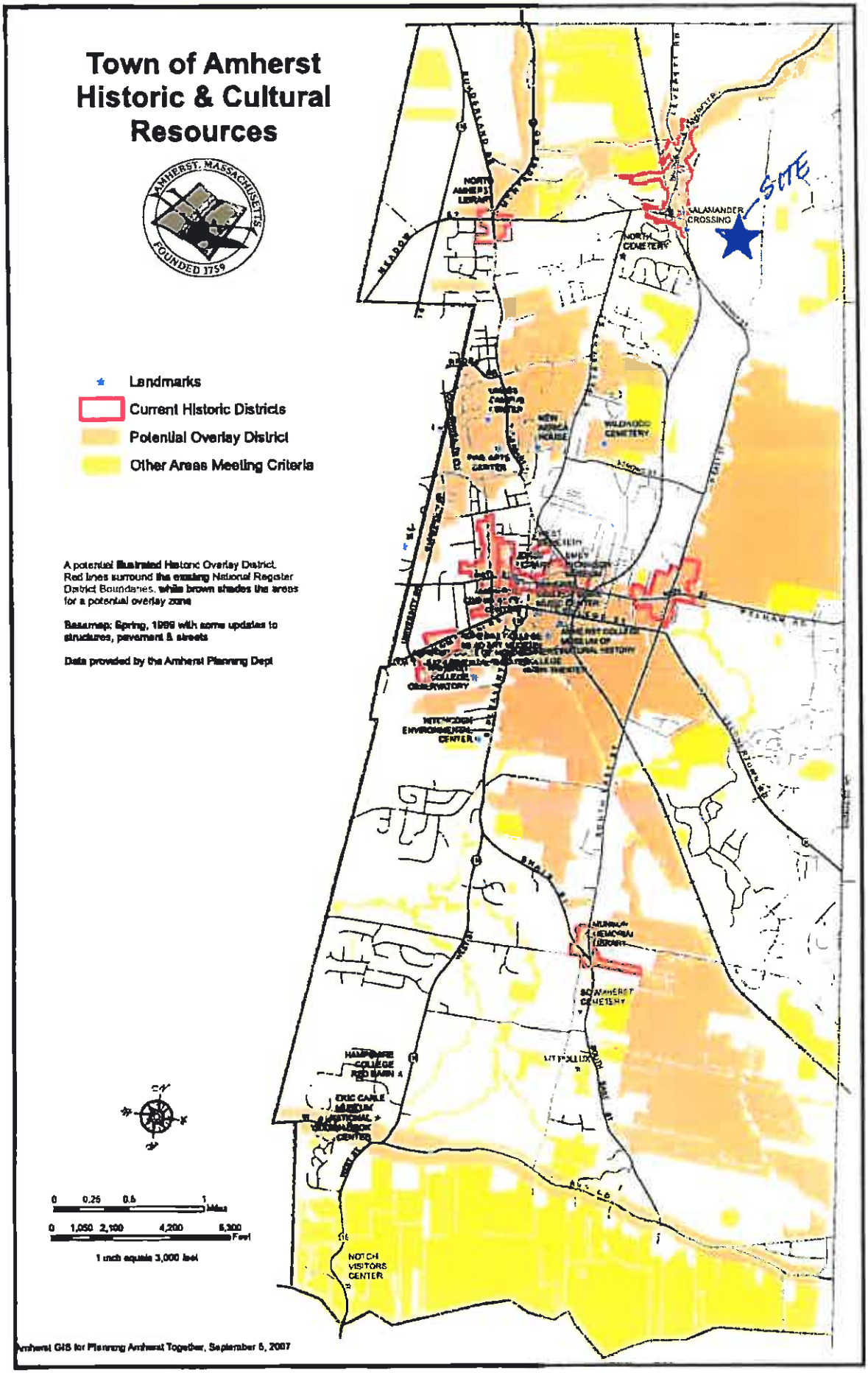
#7-3

Town of Amherst
Natural Resources



#7-4

Town of Amherst Historic & Cultural Resources



HB

REF: SEWER EXT. MASTER PLAN
Oct. 2005

Appendix F
Subarea 8 – Detailed Evaluation

There were four main alternatives considered for the High Point Drive subarea: (1) gravity and pressure sewers and a cross-country gravity sewer that conveys wastewater through an easement to the existing system; (2) gravity and pressure sewers with a pump station that conveys wastewater to new gravity sewers in Flat Hills Road and Market Hill Road connecting to the existing sewer; (3) gravity and pressure sewers with a localized package or Innovative/Alternative treatment system that only serves this neighborhood; and (4) two community septic systems. These four options are presented in Figure 4-1. As discussed earlier, wetlands treatment was also evaluated but was quickly determined to be more than twice the cost of any other alternatives and was therefore not considered further.

Each of these alternatives has advantages, disadvantages, estimated capital costs, and estimated Operations and Maintenance (O&M) costs that were used to develop the recommended plan for this subarea. While Options 3 and 4 do not appear to be cost-effective or logical solutions, both Options 1 and 2 are reasonable solutions. The following sections present the rational for the recommended plan; however, the town should weigh the economic and other costs (permitting, easement taking, etc.) to select the option that best suits the town. The following discussion presents each option as well as the recommended plan.

Local Collection System Options
For each of the options presented below, the collection system will involve both low-pressure and gravity sewers to direct the flow to its designated location (selected from one of the four options). The topography of this area prevents complete gravity flow to the designated location for any of the options. In each of these cases, a pumping station can be used in place of private grinder pump systems; however, this cost is much more expensive. With grinder pumps, however, there may be as many as 35 private grinder pumps on Overlook Drive and High Point Drive. Still, the low-pressure system is the recommended plan for the neighborhood collection system. Costs below for each option include local collection system costs and assume that many of the homes will be served by private grinder pumps.

Option 1 – Gravity and Pressure Sewers with Cross-Country Gravity Sewer
Option 1 includes a cross-country gravity sewer that connects to the existing sewer on Market Hill Road, near the Atkins Water Treatment Plant. A proposed route for the cross-country gravity sewer is presented on Figure 4-1. This option requires the Town to take an easement for the cross-country gravity sewer which could give the landowner an opportunity to develop this land, thereby increasing the population and changing the character of the area. Development would require new roads, basic utilities as well as additional sewers. On the other hand, the landowner may not be willing to grant the town an easement through this land.

Ledge, potential wetlands, easement clearing, and the steep topography of the cross country route will make construction or this option more difficult. The ledge and steep slopes in the area will require steep pipe slopes and drop connections at manholes ("stepped" sewers). The length of the cross-country sewer (approximately 0.61 miles) requires that an Environmental Notification Form (ENF) be field with the Massachusetts Environmental Protection Agency (MEPA). Construction in or near wetlands will require additional permitting; there is standing water and lower, wet areas near the proposed cross-country route. These issues could increase the construction cost, slow the schedule of this project, and will be more difficult to implement.

The estimated capital cost to construct Option 1 is $974,100, including neighborhood collection sewers, construction contingency, and engineering costs. Construction contingency and engineering implementation were each estimated as 25 percent of the construction cost.

Option 2 - Gravity and Pressure Sewers with Pump Station
Option 2 includes a pump station installed on Flat Hills Road with a force main on Flat Hills Road to the high elevation point. A gravity sewer would then be required on Flat Hills and Market Hill Roads connecting to the existing sewer on Market Hill Road near the Atkins Water Treatment Plant. The length of sewer pipe required for this option is greater than for Option 1, and a pump station on Flat Hills Road is also required. Connections for homes on Flat Hills and Market Hill Roads could be provided during construction, thereby sewering a portion of Subarea 9. While providing a sewer in Flat Hills and Market Hills Roads may encourage "filling-in" of vacant lots and some additional development along these roads, there does not appear to be a large amount of land available for development. Much of the land in this area is very steep and would make locating new homes difficult.

The estimated capital cost to construct Option 2 is $1,746,800, including neighborhood collection sewers, construction contingency and engineering costs. There is an increase in pipe quantities for this option, compared to Option 1, and O&M costs are also considered for the pump station. The total present worth cost of this option is $1,785,200.

Option 3 – Gravity and Low-Pressure Sewers with Localized Treatment System
Option 3 includes a localized treatment system that will treat wastewater from only this subarea. The estimated flow, using the required Title V guideline of 110 gpd per bedroom and the Year 2000 Amherst census data of 3.7 people per house (and therefore approximately 3 bedrooms per house) is higher than the allowable surface water discharge flow. Title V regulations specify that the maximum flow for a common Title V System is 10,000 gpd. A variance can be obtained for flows greater than 10,000 gpd but less than 15,000 gpd. Considering only existing homes, the wastewater estimate is about 16,000 gpd for this subarea, and future homes (though few) should be included in the flow estimate. The soils in this area have not been

confirmed as suitable for a leaching field. A soil analysis may render this option physically unusable.

Since the flows exceed the 15,000 gpd maximum, a single local community, package treatment plant with subsurface disposal is an option for this subarea. The term "package" refers to the assembly of various individual treatment process equipment such as settling tanks, aerators, and disinfection methods, into a compact area. Package plants are typically offered by a single manufacturer who installs pre-assembled equipment in buried tanks or small buildings. These plants can achieve the same degree of treatment as municipal wastewater treatment facilities as long as the operation and maintenance is effectively monitored. Package plants are usually automated so that an operator only has to check performance and conduct periodic maintenance. This option would involve facility siting, design, and permitting, as well as the creation of a community agency to oversee the plant operation, maintenance, repair, regulation, and administration. Traditional and alternative wastewater treatment processes may be used in package facilities, depending on the desired degree of wastewater treatment. The DEP maintains a listing of approved "Innovative/Alternative" technologies; however, the approved technologies are not the only technologies that communities/developments can use. Permitting technologies not already approved are generally cost prohibitive.

The Bioclere system was used to estimate site requirements and cost estimates for Option 3. Future build-out in the neighborhood was considered for the sizing of the system and the future Title V flow is 20,460 gpd. The system, and the necessary leaching fields for discharge, could possibly be installed on town-owned land south of High Point Drive. Figure 4-1 presents a possible layout plan for this option including the easement and access road. This is the closest town-owned land with the required area for the facilities. There are a few vacant lots that could possibly be used to site these facilities; however, on inspection, these appear to be vacant primarily because of their unfavorable conditions.

The estimated capital cost to construct Option 3 is $1,781,400, including neighborhood collection sewers, construction contingency, and engineering costs. The estimated annual O&M cost for the treatment system is $60,700 (a 20-year present worth value of $862,500), bringing the total present worth cost of this option to $2,643,900. The annual O&M cost for the treatment system includes general maintenance, licensed operator time, sample analysis, chemicals, power, and sludge disposal. The O&M estimate may change significantly during the design process due to its close dependence on the packaged system selected.

Option 4 – Gravity and Low-Pressure Sewers with Two Community Septic Systems
Since the flows exceed the 15,000 gpd maximum, a single local community, package treatment plant with subsurface disposal is an option for this subarea. However, two separate community septic systems can be used to serve this subarea. Future build-out in the neighborhood was considered for sizing the systems; the future Title V flow

is 20,460 gpd. The systems, and necessary leaching fields for discharge, could possibly be installed on town-owned land on High Point Drive and acquired land on Flat Hills Road. A pump station is required to lift the wastewater to the community septic system on Flat Hills Road. Figure 4-1 presents a possible layout plan for this option.

The estimated capital cost to construct Option 4 is $3,551,400, including neighborhood collection sewers, construction contingency, and engineering costs. The estimated annual O&M cost for the treatment systems is $36,510 (a 20-year present worth value of $557,200), bringing the total present worth cost of this option to $4,108,600. The annual O&M cost includes general maintenance and sludge disposal.

Comparison and Recommended Plan

The following table presents the cost estimate for each option with respect to how many existing homes would be served. These costs are the present worth capital and O&M estimates for each option. Power supply and permitting are not included in the costs, which would make Options 3 and 4 even more cost prohibitive.

Present Worth Capital and O&M Cost per Existing Home for Subarea 8

Option	*Homes Served*	*$/home*
Option 1	55	$17,700
Option 2	78	$22,900
Option 3	51	$51,800
Option 4	51	$80,600

Although Option 1 has the lowest cost per home, Option 2 serves 42 percent more homes for only 29 percent more cost per home (the additional homes served are located on Flat Hills and Market Hills Roads). Additionally, providing sewers in Flat Hills and Market Hill Roads (Option 2) may have a lower potential for new development than if the cross-country sewer is provided (Option 1). Wetlands on the north side of Market Hill Road will hinder potential home construction. Lastly, the difficulty required to construct Option 1 includes negotiation and acquiring an easement, very steep cross-country route to clear and maintain, steep "stepped" sewers, exceeding the threshold triggering MEPA permitting process. This difficulty, along with the added benefit of sewering additional homes, suggests Option 2 as the recommended plan.

Appendix F
Town of Amherst, MA
Wastewater Master Plan Update
Subarea 8 Cost Evaluation

			Cross-Country Sewer						Force Main and Pumping Station						Package Wastewater Treatment Facility						Community Septic System		
			Option 1A Engineer's Estimate Gravity: Flat Hills Road, some of High Point, and Cross-Country Pressure: Overlook and Juniper, some of High Point			Option 1B Engineer's Estimate Gravity: Flat Hills Road, High Point, Overlook, and Cross- Pressure: Juniper Lane One Pump Station Force Main, High Point			Option 2A Engineer's Estimate Gravity: Flat Hills, Global Hill and some of High Point Pressure: Overlook and Juniper, some of High Point One Pump Station Force Main: Flat Hills Road			Option 2B Engineer's Estimate Gravity: Flat Hills Road, High Point, Overlook Pressure: Juniper Lane Two Pump Stations Force Main: Flat Hills and High Point			Option 3A Engineer's Estimate Gravity: Flat Hills Road, High Point, Overlook Pressure: Juniper Lane and some of High Point			Option 3B Engineer's Estimate Gravity: Flat Hills Road, High Point, Overlook Pressure: Juniper Lane One Pump Station Force Main, High Point			Option 4 Engineer's Estimate Gravity: Portion of all streets except Juniper Lane Pressure: Juniper Lane and portions of all other streets One Pump Station Force Main, Flat Hills		
Item No.	Description	Unit	Estim. Quantity	Unit Price	Total	Estim. Quantity	Unit Price	Total	Estim. Quantity	Unit Price [1]	Total	Estim. Quantity	Unit Price	Total	Estim. Quantity	Unit Price	Total	Estim. Quantity	Unit Price	Total	Estim. Quantity	Unit Price	Total
SEWERS																							
	F&I 8-in PVC/DI Sewer (all depths and appurtenances) NEIGHBORHOOD	LF	1,300	$110	[illegible]	5,000	$110	[illegible]	1,300	$110	[illegible]	4,830	$110	[illegible]	2,000	$110	[illegible]	3,400	$110	$374,000	2,700	$110	$297,000
	F&I 8-in PVC/DI Sewer (all depths and appurtenances) TRANSMISSION	LF	2,900	$110	[illegible]	2,900	$110	[illegible]	[illegible]	$110	[illegible]	[illegible]	$110	[illegible]	1,000	$110	$110,000	1,000	$110	$110,000	0	$110	$0
	F&I DI Force Main (all depths and appurtenances) NEIGHBORHOOD	LF	0	$36	$0	1,200	$36	$43,200	0	[illegible]	$0	1,200	$36	$43,200	0	$36	$0	1,800	$36	$64,800	0	$36	$0
	F&I DI Force Main (all depths and appurtenances) TRANSMISSION	LF	0	$36	$0	0	$36	$0	[illegible]	$36	[illegible]	1,500	$36	$54,000	0	$36	$0	0	$36	$0	[illegible]	$36	[illegible]
	F&I PVC Pressure Sewer (all depths and appurtenances) NEIGHBORHOOD	LF	3,900	$36	[illegible]	400	$36	$14,400	[illegible]	$36	[illegible]	400	$36	$14,400	2,200	$36	$79,200	400	$36	$14,400	3,100	$36	[illegible]
	F&I PVC Pressure Sewer (all depths and appurtenances) TRANSMISSION	LF	0	$36	$0	0	$36	$0	0	$36	$0	0	$36	$0	0	$36	$0	0	$36	$0	0	$36	$0
PUMP STATIONS																							
	F&I High Point Pumping Station, Option 1B	LS			$0		[illegible]	[illegible]			$0			$0			$0			$0			$0
	F&I Flat Hills Pumping Station, Option 2A, 2B, 4	LS			$0			$0		[illegible]	[illegible]		[illegible]	[illegible]			$0			$0		[illegible]	[illegible]
	F&I High Point Pumping Station, Option 2B	LS			$0			$0			$0		[illegible]	[illegible]			$0			$0			$0
	F&I High Point Pumping Station, Option 3B	LS			$0			$0			$0			$0			$0		[illegible]	[illegible]			$0
	Pump Station O&M yearly [1]	LS per PS			$0		$2,700	$2,700		$2,700	$2,700		$2,700	$5,400			$0		$2,700	$2,700		$2,700	$2,700
TREATMENT SYSTEM																							
	Localized Treatment System, Option 3A & 3B	LS			$0			$0			$0			$0		$634,000	$634,000		$634,000	$634,000			$0
	Option 3 O&M, yearly [2]	LS			$0			$0			$0			$0		$40,700	$40,700		$40,700	$40,700			$0
	Community Septic System, Option 4	LS per home			$0			$0			$0			$0			$0			$0		[illegible]	[illegible]
	Option 4 O&M, yearly [3]	LS			$0			$0			$0			$0			$0			$0			$0
Capital Cost Subtotal					[illegible]			[illegible]			[illegible]			[illegible]			[illegible]			[illegible]			[illegible]
Land Acquisition/Easement Cost					[illegible]			[illegible]			[illegible]			[illegible]			[illegible]			[illegible]			[illegible]
Construction Contingency 25%					[illegible]			[illegible]			[illegible]			[illegible]			[illegible]			[illegible]			[illegible]
Engineering and Implementation 25%					[illegible]			[illegible]			[illegible]			[illegible]			[illegible]			[illegible]			[illegible]
Capital Cost					**$974,100**			**$1,687,600**			**$1,748,800**			**$2,460,400**			**$1,781,400**			**$2,160,400**			**$3,881,400**
O&M Present Worth [4]					$0			[illegible]			[illegible]			[illegible]			[illegible]			[illegible]			[illegible]
Total Present Worth Cost					**$974,100**			**$1,726,000**			**$1,786,200**			**$2,837,100**			**$2,643,500**			**$3,081,300**			**$4,108,600**

Notes: 1. Estimated O&M cost for pump stations includes power cost ($0.11/kWh with 8 hp pumps that operate 5 hours/day) and pump station maintenance of $1,700/yr

2. Estimated O&M cost for package treatment facility

Power	$3,270	$0.10/gpd
Operator	$21,200	20 hrs/wk at $40/hr
Sample Testing	[illegible]	[illegible]/month
Chemicals	$1,970	[illegible]/month
Option 3 General Maintenance	$10,700	2% of treatment system capital cost (not including leach field)
Sludge Disposal	$10,010	$0.11/gal of sludge
Option 3 O&M Total:	$40,700	per year

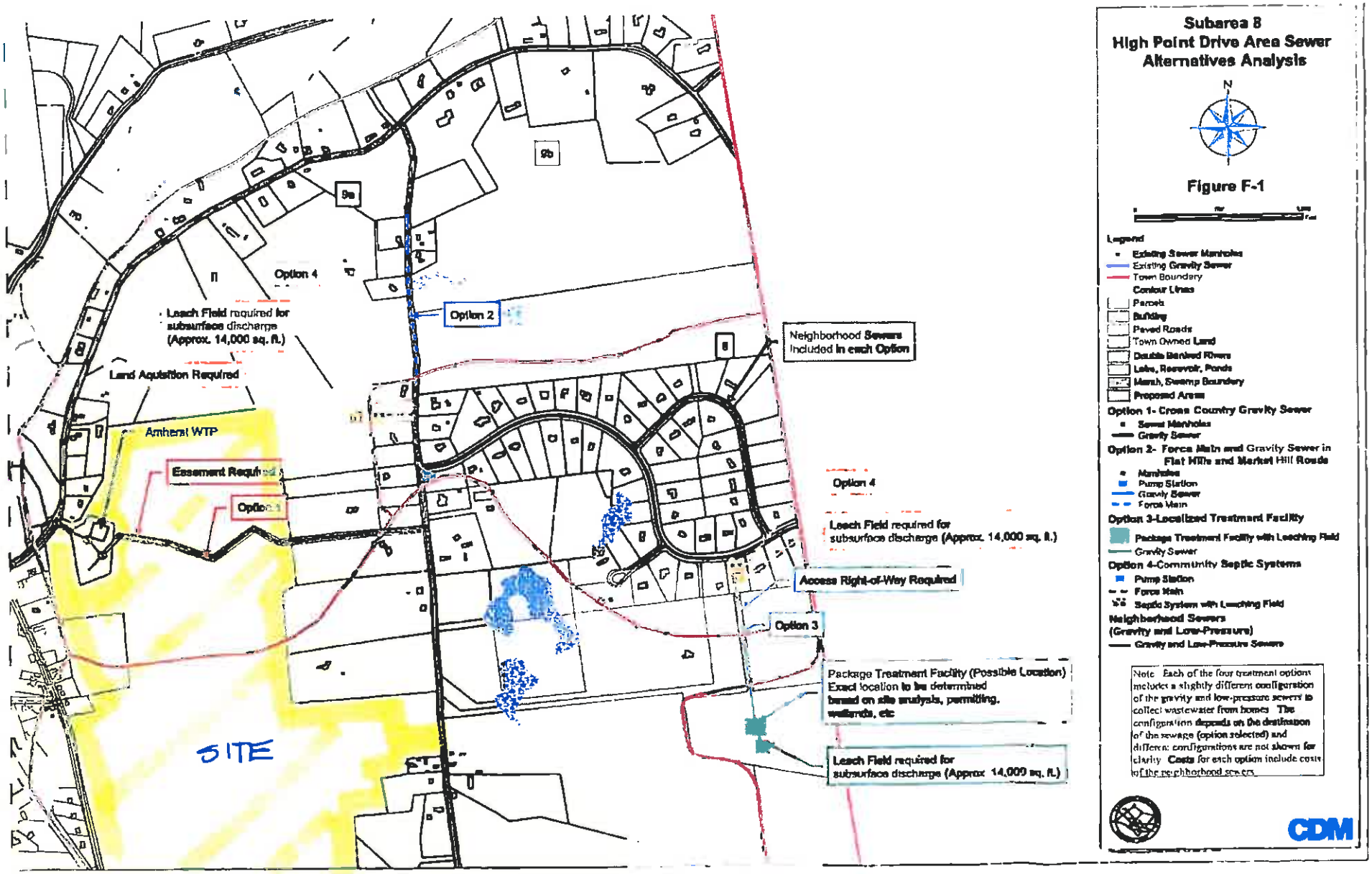
3. Estimated O&M cost for community septic systems

General Maintenance	[illegible]	2% of treatment system capital cost
Solids Removal	[illegible]	$0.11/gal of sludge
Option 4 O&M Total:	[illegible]	per year

4. O&M Present Worth Cost calculated assuming 20 year life and interest rate of [illegible]%

CDM

#9-5


Subarea 8
High Point Drive Area Sewer
Alternatives Analysis
Figure F-1
Legend
Existing Sewer Manholes
Existing Gravity Sewer
Town Boundary
Contour Lines
Parcels
Building
Paved Roads
Town Owned Land
Double Banked Rivers
Lake, Reservoir, Ponds
Marsh, Swamp Boundary
Proposed Areas
Option 1- Cross Country Gravity Sewer
Sewer Manholes
Gravity Sewer
Option 2- Force Main and Gravity Sewer in Flat Hills and Market Hill Roads
Manholes
Pump Station
Gravity Sewer
Force Main
Option 3-Localized Treatment Facility
Package Treatment Facility with Leaching Field
Gravity Sewer
Option 4-Community Septic Systems
Pump Station
Force Main
Septic System with Leaching Field
Neighborhood Sewers (Gravity and Low-Pressure)
Gravity and Low-Pressure Sewers
Note: Each of the four treatment options includes a slightly different configuration of the gravity and low-pressure sewers to collect wastewater from homes. The configuration depends on the destination of the sewage (option selected) and different configurations are not shown for clarity. Costs for each option include costs of the neighborhood sewers.
CDM
Option 4
Option 2
Leach Field required for subsurface discharge (Approx. 14,000 sq. ft.)
Land Aquisition Required
Amherst WTP
Easement Required
Option 1
Neighborhood Sewers Included in each Option
Option 4
Leach Field required for subsurface discharge (Approx. 14,000 sq. ft.)
Access Right-of-Way Required
Option 3
Package Treatment Facility (Possible Location) Exact location to be determined based on site analysis, permitting, wetlands, etc
Leach Field required for subsurface discharge (Approx. 14,000 sq. ft.)
SITE

#9b